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COMMUNICATION DEVICE

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[There are no amendments to this patent.]

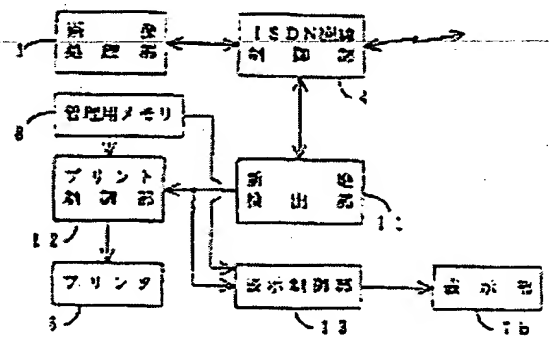
Abstract

Purpose

To prevent transmission and reception failure due to forgetting to correct setting information when a terminal connected to an ISDN is moved.

Constitution

Disconnection detecting part (11) detects disconnection of terminal and line based on the data fetched from ISDN line control part (4). Based on the detection result, a prescribed message is printed or displayed by printer (6) or display (7b), and the operator is notified to review and amend the setting information. The data fetched from ISDN line control part (4) include data indicating the presence/absence of power supply from network terminal device NT, and the presence/absence of INFO (2) in the interface start procedure. Disconnection detecting part (11) has a means for determining whether the potential difference between two power feed lines is below a threshold for detecting the presence/absence of power supply. Also, in order to detect the presence/absence of INFO (2), disconnection detecting part (11) has a means that outputs INFO (1) and a means for monitoring INFO (2) that responds to said output.



Key:
	1	Image processing part
	4	ISDN line control part
	6	Printer
	7b	Display
	8	Memory for management
	11	Disconnection detecting part
	12	Printing control part
	13	Display control part

Claim

A type of communication device characterized by the fact that in a communication device connected to an ISDN, there are the following means: a means that detects disconnection of a terminal and line and outputs a disconnection detection signal, and a notification means that prompts the operator to check the setting information for the terminal.

Detailed explanation of the invention

[0001]

Industrial application field

This invention pertains to a type of communication device. In particular, this invention pertains to a type of communication device for use in connecting to an Integrated Services Digital Network (ISDN).

[0002]

Prior art

ISDN, which integrates various types of communication media and combines them with information processing technology to realize a new communication service, has been adopted for many practical applications. ISDN has the advantage that it allows moving fax machines, telephones, personal computers, and other terminals connected to it.

[0003]

That is, in a home or an office, ISDN jacks are placed in multiple locations, and equipment can be used immediately by simply inserting its plug into a jack. When the location of a terminal is to be changed, one simply pulls out the plug from the jack and moves the equipment to any location where there is another jack, and communication can be achieved by means of said other jack.

[0004]

This is achieved because the types and device constants for the various terminals can be determined and processed by the network, so that the communication line can be shared by the various types of terminals.

[0005]

Problems to be solved by the invention

The aforementioned ISDN has the following problems. In a conventional public service telephone network (PSTN), for example, when the fax machine, telephone, or other terminal connected to a telephone line with a certain dial number is moved and connected to a telephone line having another dial number, communication can be effected in the same way as that when connected to the prior telephone line.

[0006]

On the other hand, for the newly provided ISDN, the terminal informs the network of the information set at the terminal (to be referred to as setting information hereafter) and the network notifies the terminal on the receiving side of the information for the terminal on the sender side. This notification enables the network and terminal to check the setting information to prevent erroneous communication. The terminal can be identified by means of this function. Consequently, the line can be shared, the ease of moving terminals is improved, and display of the sender number, display of the receiver number, and other services characteristic of the various types of ISDN can be realized. Also, the setting information for a terminal includes its own number, its own sub-address, packet communication type, etc.

[0007]

Consequently, when a terminal is moved, if its own number and sub-address, etc., are not amended and renewed, the information sent from the network and the setting information become different from each other. As a result, reception or transmission may not be possible.

[0008]

As explained above, if a terminal is moved, the person in charge of service and the terminal user have to re-input and renew the setting information. However, the setting information may not be input due to negligence. This is undesirable.

[0009]

The purpose of this invention is to solve the aforementioned problems of the prior art by providing a type of communication device that can display the off-line status of the terminal so as to prevent the problem of failure to amend the setting information when a terminal is moved.

[0010]

Means for solving the problems

In order to solve the aforementioned problem, this invention provides a type of communication device that has a means that detects disconnection of a terminal and line and outputs a disconnection detection signal, and a notification means that prompts the operator to check the setting information for the terminal.

[0011]

Operation

According to this invention with the aforementioned characteristic features, when a terminal is disconnected from the line, a notification is automatically issued to prompt the operator to check the setting information and to input it. As a result, it can prevent discrepancies in the setting information due to forgetting to amend the setting information and the problem of communication failure as a result of said negligence.

[0012]

Application examples

In the following, this invention will be explained in more detail with reference to figures. Figure 4 is a block diagram illustrating the hardware constitution of a G4 fax machine in an application example of this invention. As shown in this figure, image processing part (1) has the encoding/decoding function for encoding and decoding the image information for the original read with reader (2).

[0013]

When the image information is sent, the image information that has been subjected to image processing in image processing part (1) is sequentially input to image information memory (3) and is stored there. The stored image information is sequentially sent out via ISDN line control part (4) to the line.

[0014]

On the other hand, in the event of reception, the image information fetched from the line via ISDN line control part (4) is stored in image information memory (3). The received image information stored in image information memory (3) is decoded and output to printer (6) to be printed.

[0015]

Operating panel (7) has key input part (7a) and LCD or other display (7b), and it is used to input and set various instructions and to display the processing results. Said elements are controlled by system control part (5) according to the program and management data stored in management memory (8). This system control part (5) may be formed from a microcomputer (CPU).

[0016]

In the following, supplying power to said fax machine will be explained. Figure 7 is a diagram illustrating the circuit of the interface between terminal (fax machine) TE and network terminal device NT.

[0017]

As shown in this figure, the interface circuit is composed of two sending lines SL for sending the signal and communication information from terminal TE to network terminal device NT, and two receiving lines RL for sending the signal and communication information from network terminal device NT to terminal TE.

[0018]

By means of said lines SL, RL, power is fed to terminal TE from power supply (9) provided at network terminal device NT, and the power fed is received by power receiving part (10) at terminal TE. This system for application of DC voltage between sending line SL and receiving line RL is called phantom power supply. Although this power delivery system is commonly adopted, other systems, such as feeding power to terminal TE from network terminal device NT using another line, may also be adopted.

[0019]

In the following, starting the ISDN basic interface in layer (1) will be explained. Figure 8 is a diagram illustrating the process of starting from terminal TE. In the start process illustrated in this figure, an electric signal frame (INFO) with a prescribed bit pattern is exchanged between terminal TE and network terminal device NT.

[0020]

In the stop state, INFO (0) (no signal) is exchanged between terminal TE and network terminal device NT. When there is a request to start the interface, terminal TE changes from the previous INFO (0) and sends out INFO (1). As a response to said (1), network terminal device NT sends INFO (2). As a response to this INFO, terminal TE sends INFO (3) (normal signal). Upon receiving said INFO (3), network terminal device NT notifies the upper function (layer (2)) of start. Finally, network terminal device NT starts sending INFO (4) (normal signal), and startup of the interface in layer (1) comes to an end.

[0021]

In the following, the operation of this application example will be explained. Figure 1 is a block diagram illustrating the function of the main portion in this application example. The same part numbers are adopted here as those in Figure 4.

[0022]

As shown in this figure, when the ISDN plug of the fax machine as the terminal is pulled out of the jack and the line and the terminal are disconnected (disconnection), the disconnection state is detected by disconnection detecting part (11), and a disconnection detection signal is output. This disconnection detection signal is sent to print control part (12) and display control part (13). When the disconnection detection signal is sent to print control part (12) and display control part (13), the message stored in said management memory (8) beforehand is read and output to printer (6), and it is displayed on display (7b).

[0023]

In the following, a specific example of said disconnection detecting part (11) will be explained. Figure 2 is a block diagram illustrating this first application example. In this application example, the rule of exchange of frame INFO for the interface explained in Figure 8 is used. That is, in the exchange of INFO, when a prescribed INFO is output from terminal TE, network terminal device NT returns a prescribed INFO as a response to it. Consequently, this process is used.

[0024]

As shown in Figure 2, at a prescribed interrupt timing, start request output part (14) outputs a start request signal to frame generating part (15). This signal is the same as the start request signal explained with respect to Figure 8.

[0025]

As a response to said start request signal, frame generating part (15) generates INFO (1), and sends it to ISDN line control part (4). ISDN line control part (4) sends said INFO (1) to network terminal device NT. When the terminal is connected to the line, network terminal device NT should return INFO (2) with respect to said INFO (1).

[0026]

Consequently, after said INFO (1) is sent frame monitoring part (16), INFO (2) is received within the prescribed time by ISDN line control part (4). A monitoring time of about

30 sec is appropriate. If INFO (2) is not detected during this period, it is determined that the plug has been pulled out, and said disconnection detection signal is output.

[0027]

In the following, the second application example of disconnection detecting part (11) will be explained. Figure 3 is a block diagram illustrating the second application example. In this application example, disconnection between the terminal and the line is detected by means of the status of power supply from network terminal device NT. That is, when power is supplied by network terminal device NT to terminal TE, there is a prescribed potential difference between said sending line SL and receiving line RL. When the potential difference is below a prescribed value, it is determined that the line and the terminal are disconnected from each other.

[0028]

As shown in Figure 3, potential difference detecting part (17) detects the potential difference between sending line SL and receiving line RL taken into ISDN line control part (4). Power delivery monitoring part (18) compares the detected value sent from potential difference detecting part (17) and the threshold sent from threshold setting part (19), and when the detected value is below the threshold, outputs a disconnection detection signal.

[0029]

The disconnection detection signal continues until the operator inputs the prescribed reset signal. This is to prevent disappearance of the message displayed on display (1b) when the plug of the terminal is simply inserted into the ISDN jack without the displayed message being noticed.

[0030]

In the following, the operation of said first and second application examples will be explained. First of all, the operation of the first application example will be explained, wherein disconnection of the terminal and line is detected by means of the presence/absence of INFO (2), and that status is displayed to the operator.

[0031]

In the flow chart shown in Figure 5, the presence/absence of the start request signal is determined in step S1. If the start request signal is detected, process flow goes to step S2, and INFO (1) is sent in ISDN layer (1). In step S3, a timer set with the wait time for INFO (2) is started. In step S4, determination is made as to whether INFO (2) has been detected. If INFO (2)

is not detected, process flow goes to step S5, in which judgment is made on whether the time set in step S3 has elapsed.

[0032]

In step S5, when the determined result is YES, that is, when INFO (2) has still not been detected before the timer set time has elapsed, it is determined that disconnection between the terminal and line has taken place, and process flow goes to step S6.

[0033]

In step S6, a disconnection detection signal is output to print control part (12) and display control part (13). In step S7, as a response to the disconnection detection signal, print control part (12) and display control part (13) print a prescribed message and display it on display (7b).

[0034]

In step S8, it is determined whether the setting information, such as the self-address, self-sub-address, packet communication type, etc., has been checked and amended. This determination can be performed by operating a reset switch in operating panel (7), and using the reset switch for determining whether the operator has intervened.

[0035]

In step S9, output of the detection signal signifying between terminal and line is stopped.

[0036]

In the following, the operation of the second application example will be explained, wherein disconnection between the terminal and line is detected according to the power supply status, and the operator is notified.

[0037]

As shown in the flow chart of Figure 6, in step S10, potential difference value Vd is read from potential difference detecting part (17). In step S11, threshold Vs is read from threshold setting part (19). In step S12, determination is made as to whether the potential difference value Vd is below threshold value Vs. If the determination in step S12 is YES, process flow goes to step S13. Because steps S13-S16 are the same as steps S6-S9 in the first application example, they will not be explained again.

[0038]

In the application examples explained above, a fax machine connected to an ISDN has been used as an example. However, this invention also applies to other communication devices, such as telephones, personal computers, etc., connected to an ISDN.

[0039]

In this application example, the potential difference between sending line SL and receiving line RL is monitored, and the power supply status is detected. The same effect as that in said application example can be realized by monitoring the potential difference of another circuit serving as a system for supplying power to terminal NT [sic; TE] from network terminal device NT.

[0040]

In said application example, the message is both printed and displayed to prompt the operator to amend the setting information. However, it is also possible to perform only printing or only displaying.

[0041]

Effects of the invention

As explained above, according to this invention, the fact that a terminal is disconnected from the line can be recognized easily, and based on the recognition result, the operator is prompted to review and amend the setting information. As a result, it is possible to eliminate the problem of the prior art, wherein discrepancies occur due to movement of the terminal, making reception or transmission impossible.

Brief description of the figures

Figure 1 is a block diagram illustrating the function of the main portion in an application example of this invention.

Figure 2 is a block diagram illustrating the function in the first application example of the disconnection detection part.

Figure 3 is a block diagram illustrating the function in the second application example of the disconnection detection part.

Figure 4 is a block diagram illustrating the hardware constitution of a fax machine.

Figure 5 is a flow chart illustrating the operation of the first application example.

Figure 6 is a flow chart illustrating the operation of the second application example.

Figure 7 is a diagram illustrating the interface circuit.

Figure 8 is a diagram illustrating the start protocol for the interface.

Explanation of symbols

4	ISDN line control part
5	System control part
6	Printer
7b	Display control part
11	Disconnection detecting part
12	Print control part
13	Display control part
14	Start request output part
15	Frame generating part
16	Frame monitoring part
17	Potential difference detecting part
18	Power delivery monitoring part

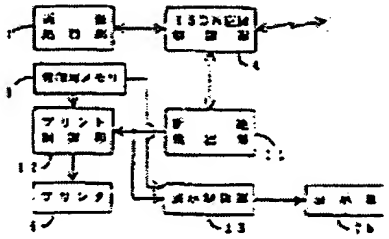


Figure 1

Key:

1	Image processing part
4	ISDN line control part
6	Printer
7b	Display unit
8	Memory for management
11	Disconnection detecting part
12	Print control part
13	Display control part

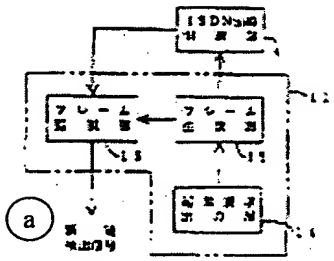


Figure 2

Key: a Disconnection detection signal
4 ISDN line control part
14 Start request output part
15 Frame generating part
16 Frame monitoring part

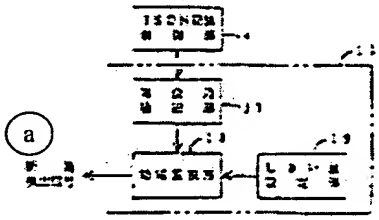


Figure 3

Key: a Disconnection detection signal
4 ISDN line control part
17 Potential difference detecting part
18 Power delivery monitoring part
19 Threshold setting part

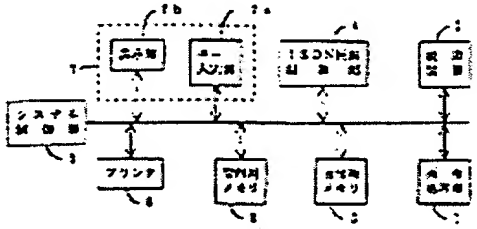


Figure 4

Key: 1 Image processing
2 Reader
3 Image information memory
4 ISDN line control part

5	System control part
6	Printer
7a	Display
7b	Key input part
8	Memory for management

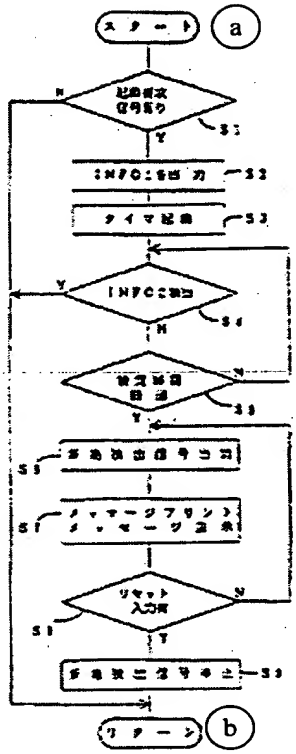


Figure 5

Key:		
	a	Start
	b	Return
	S1	Is there a start request signal?
	S2	Output of INFO (1)
	S3	Start timer
	S4	INFO (2) detected?
	S5	Has set time elapsed?
	S6	Output of disconnection detection signal
	S7	Printing, display of message
	S8	Has reset been performed?
	S9	Stop disconnection detection signal

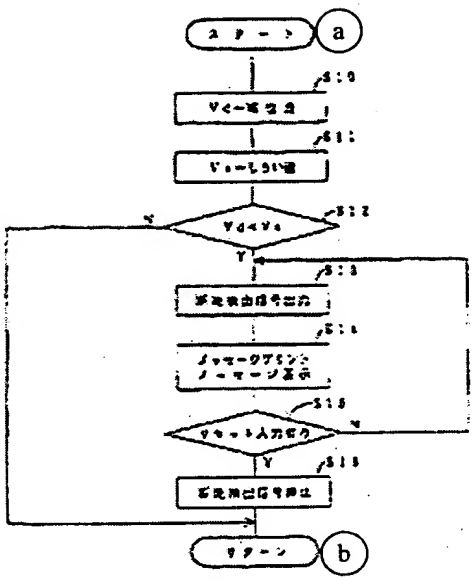


Figure 6

Key:
- a Start
- b Return
- S10 Read potential difference V_d
- S11 Read threshold value V_s
- S12 $V_d < V_s$
- S13 Output of disconnection detection signal
- S14 Printing, display of message
- S15 Has reset been performed?
- S16 Stop disconnection detection signal

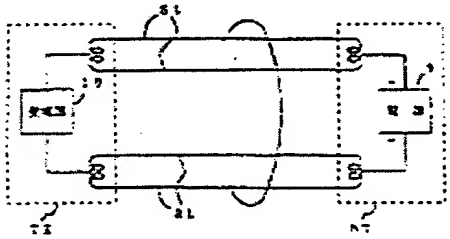


Figure 7

Key:
- 9 Power supply
- 10 Power receiving part

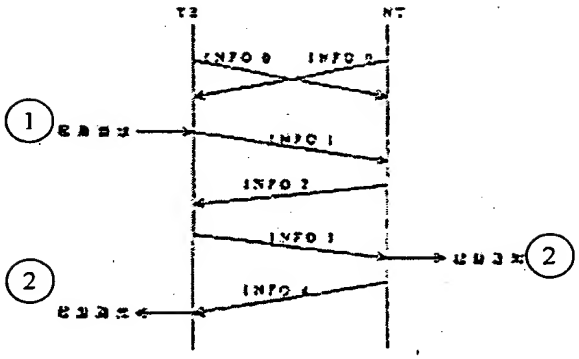


Figure 8

Key: 1 Start request
2 Notification of start